

EPIPHYTIC BROMELIADS ON FLORIDA TREES

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Misconceptions persist concerning the impact of epiphytic bromeliads on woody ornamentals, especially trees. A clarification of the relationships and interactions between these vascular epiphytes and their hosts is worthwhile for those who might consider such epiphytes to be more harmful to their host than they really are. In most cases, naturally occurring epiphytic bromeliads are best left alone to be enjoyed as a normal and ecologically interesting component of the ecosystem. A better understanding of the natural history of these true epiphytes should help foster that appreciation.

DEFINITIONS: Definitions of a few key words are necessary to describe the host relationships and feeding mechanisms of epiphytic bromeliads. An epiphyte in the present context is a plant that grows upon another plant without parasitizing that plant. A phorophyte is a host plant used by an epiphyte for physical support. Commensalism describes the relationship between the two different organisms in which one partner (the epiphyte) benefits from the association while the other participant (the phorophyte) is neither harmed nor helped. Epiphytic bromeliads are ombrotrophic, meaning that they obtain their nutrients as leachate in rainfall. Bromeliad enthusiasts classify the epiphytic bromeliads with no water-impounding capabilities as atmospheric because they use only absorbing trichomes (leaf hairs) to scavenge water and nutrients from airborne particulates and leachates in precipitation. Roots, if present at all, are support organs which simply attach the epiphyte to the phorophyte, and in the case of atmospheric, are not nutrient-absorbing organs at all (1,4). The terms xerophytic and oligotrophic also apply to most epiphytic bromeliads, meaning they are adapted to a dry and to a nutrient deficient habitat, respectively. The epiphytic adaptation is one means of reaching adequate light to support plant growth in a crowded habitat without the metabolic expense of growing a massive trunk. The trade-off in this adaptation is not having direct access to soil to provide water and nutrients. Another result of this adaptation is a relatively slow growth rate coupled with longevity of living tissues of the epiphyte (2).

EPIPHYTIC BROMELIADS OF FLORIDA: About half of the Bromeliaceae have epiphytic capabilities. The most common epiphytic bromeliad encountered in Florida is undoubtedly the plant known popularly as "Spanish moss", Tillandsia usneoides L. (4,5). This nearly rootless epiphyte is a standard feature of the southern landscape (Fig. 1 & 2), and historically has been used in huge quantities as an upholstery stuffing, and is currently in demand by florists for varying ornamental uses. Other epiphytic bromeliads native to Florida are Tillandsia balbisiana Schultes, T. bartramii Elliott, T. circinnata Schlechtendal, T. fasciculata Swartz, T. flexuosa (Swartz) L.B. Smith, T. polystachia (L.) L., T. pruinosa Swartz, T. recurvata L. ("ball" or "bunch moss", Fig. 4), T. setacea Swartz, T. utriculata L., and T. valenzuelana A. Richard (4,6). These epiphytes

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are not phorophyte specific, but do have rather exacting site requirements that dictate where the airborne seeds will lodge, germinate, establish, and prosper. Since roots are slow to appear, smooth or sloughing bark quickly sheds plantlets before they get established (Fig. 3). Disturbance of the site could easily dislodge the slow growing epiphyte before it can anchor itself. Overall patchiness of suitable habitat is yet another restraint on epiphytic bromeliads, in addition to the stresses imposed by low nutrient and intermittent water supplies. A balance between adequate light for photosynthesis and adequate moisture and nutrients is struck by the location of the epiphyte in the crown of its phorophyte: too far out on the perimeter of the crown may prove too dry, while the interior of the phorophyte crown may be light-limiting (2).

DAMAGE BY EPIPHYTES: On rare occasions, the presence of epiphytic bromeliads can be damaging to its phorophyte. Those occasions are: a) when the very weight of the epiphyte load, especially when wet, threatens to break limbs of the phorophyte (7); b) when the epiphyte load is dense enough to restrict light to the phorophyte foliage and to desirable plants below; and c) when the epiphyte load is great enough to act as a sink for scarce nutrients that would otherwise be available by recycling for phorophyte use. This last unusual situation, known as nutritional piracy (1,2,3), is reported to occur on extremely nutrient deficient sites with low moisture and nutrient holding capacity in the usually acid, sandy soil. The phorophyte, if it is truly being adversely impacted by its epiphyte population, should be exhibiting an overall general decline in its crown, rather than a spotty decline of just a section of an otherwise healthy crown. In such cases, half or more of the site's available nitrogen, potassium, and phosphorus is tied up in the long-lived foliage of the epiphyte, essentially diverted from the nutrient cycle to which the phorophyte has access.

CONTROL: In the majority of cases where epiphytic bromeliads are associated with a phorophyte in poor vigor, the epiphyte presence is merely coincidental, not causal. Other less obvious and genuine causal agents are undoubtedly involved. With a reminder to the reader that in most cases epiphyte control is unwarranted, the following recommendations can be used to reduce epiphyte impact of the rare detrimental kinds. As a rule, copper, manganese, and zinc ions are toxic to bromeliads in very low doses (1). Therefore, the use of EPA-registered copper, manganese, and zinc-containing fungicides on phorophytes for fungal disease control may be useful. In such situations, these fungicides will perform as a slow-acting, selective herbicide on the bromeliad epiphytes. Epiphytic bromeliads killed by application of EPA-registered fungicides remain in place to slowly weather away. A more appealing control option in verifiable cases of nutritional piracy is to supply the deficient nitrogen, potassium, and phosphorus to the soil on the site in the form of fertilizer in light doses on a regular basis. Phorophyte improvement can be expected within a few growing seasons as the competition for nutrients shifts back in favor of the phorophyte. Mechanical "de-mossing" should be considered a somewhat temporary though immediate solution to the problems of excess epiphyte weight and understory shading problems. Mechanical removal of epiphytes is definitely inappropriate treatment for reversing nutritional piracy cases unless the removed carcasses are left on site to decay, thus releasing their stored nutrients to the cycle again.



Figures 1 & 2. Tillandsia usneoides (spanish moss) habit on Quercus laevis Walt. (turkey oak) and Pinus elliottii Engelm., (slash pine), respectively.

Figure 3. Young plantlets of Tillandsia usneoides becoming established on the rough bark of Quercus virginiana Mill. (live oak).

Figure 4. Tillandsia recurvata (ball moss) attached to a dead Crataegus floridana Sarg. (Jacksonville hawthorn) twig.

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